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Indian Standard

GUIDE FOR PREPARATION OF DRAWINGS OF SEMICONDUCTOR DEVICES

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 6 *August* 1969

Indian Standard

GUIDE FOR PREPARATION OF DRAWINGS OF SEMICONDUCTOR DEVICES

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(*Continued from page* 1)

Panel for Mechanical Standardization of Semiconductor Devices, ETDC 40 : P1

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*Dr B. H. Wadia was Convener for the meeting at which this standard was recommended for finalization.

Indian Standard

GUIDE FOR PREPARATION OF DRAWINGS OF SEMICONDUCTOR DEVICES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 1 February 1969, after the draft finalized by the Semiconductor Devices Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard deals with the guiding principles for the preparation of drawings for semiconductor devices, such as device outlines, base outlines, and case outlines. It confines itself only to the mechanical outlines and does not concern with the various internal connections and details of the devices which may go into these outlines.

0.3 This standard is based largely on IEC Pub 191-1 'Mechanical standardization of semiconductor devices: Part I Preparation of drawings of semiconductor devices' issued by International Electrotechnical Commission.

0.4 This standard is one of a series of Indian Standards on semiconductor devices.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS:2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down guiding principles for the preparation of out line drawings of semiconductor devices, such as device outlines, case outlines and base outlines.

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*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions in addition to those specified in IS:1885 (Part VII)-1965* shall apply.

2.1 Device Outline Drawing — A drawing which includes all dimensional characteristics required for the mechanical interchangeability of the complete device.

It includes the case or body, all terminals and the locating tab, if present.

2.2 Terminal — That part of the semiconductor device primarily used in making an electrical, mechanical or thermal connection.

Examples of terminals are flexible leads, rigid leads, pins, studs, etc.

2.3 Case Outline Drawing — A drawing which includes all dimensional characteristics required for the mechanical interchangeability of the case or body.

It does not include the dimensions of the terminals or the locating tab, if present, but their positions are shown by dotted lines.

2.4 Base Outline Drawing — A drawing which includes all dimensional characteristics of base required for the mechanical interchangeability of the terminals and mechanical index.

Examples of these characteristics are lead length, lead diameters with controlled zones, lead spacing, pitch circle diameter of the leads, thickness, width and length of a tab, etc.

The diameter or major axis of the case outline should not be given on the base drawing.

NOTE — Many semiconductor devices have identical cases, but differ in the number or the length of terminals. It is also possible to have the same type of base associated with cases which are not identical.

Consequently, there are advantages in having: (a) a single drawing including only the dimensional characteristics of the case outline and separate drawings for the various bases which can be associated with this case outline, or (b) a single drawing including only the dimensional characteristics of the base and separate drawings for the various case outlines which can be associated with this base.

2.5 Mechanical Index — A locating feature, or that portion of the device specifically designed to provide orientation.

Examples of a mechanical index are key, keyway, locating tab, etc.

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*Electrotechnical vocabulary: Part VII Semiconductor devices.

2.6 Visual Index — Any single terminal (or omission of) readily distinguishable by the eye from others, or any distinctive boss, stippled pattern or colour mark adjacent to a terminal.

2.7 Datum Line — A line defined by a mechanical or a visual index and used as a reference for locating and numbering terminals.

2.8 Seating Plane or Seating Base — A reference plane from which, in general, outline and base dimensions are given.

2.9 Seated Height or Mounted Height — The distance from the seating plane to the top of any exposed tip or rigid terminal present, otherwise to the top of the outline. Flexible terminals should not be included as part of the seated height, but the mounted height should include a minimum allowance necessary for an axially mounted flexible lead to be bent at right angles.

2.10 Controlled Cylindrical Zone — A zone which defines a portion of the body of minimum length over which the diameter is controlled to closer tolerances than is allowed over the full length of the body.

3. GENERAL

3.1 The primary object of these drawings is to indicate the space which should be allowed for devices in an equipment together with other dimensional characteristics required to ensure mechanical interchangeability. It should be understood that complete interchangeability involves other considerations, such as the electrical and thermal characteristics of the semiconductor devices concerned.

NOTE — Additional details on the standardization philosophy adopted for this standard are given in Appendix A.

3.2 The form of standardization represented by this standard is properly termed ' unification ' and consists of combining the dimensions of a number of manufacturers' devices in a single drawing in such a way that the devices obtained are mechanically interchangeable.

3.3 If a manufacturer describes a device as conforming to a standard outline, the dimensions shown on the relevant data sheet shall comply with, or fall within the tolerances of the standard drawing. The equipment designer, when using the standard drawings, is strongly advised to use the tolerances shown in this standard if he wishes to take advantage of the availability of supplies from more than one manufacturer.

3.4 The dimensions on the standard drawing are such, however, that the tolerances shown are considered acceptable for the purposes of mechanical interchangeability in an equipment, or for adaptation to other accessories when incorporated in an equipment and for good engineering practice.

3.5 It is also assumed that in the drawings for high power devices used in larger equipment where packing density requirements may not be as stringent as those for low power devices in smaller equipment, the space required for the case of the device need not be defined as closely as the space for the cases of the smaller transistors and diodes. This does not seriously affect the interchangeability value of the information for high power devices.

4. GENERAL RULES FOR ALL DRAWINGS

4.1 Drawing Layout

4.1.1 A drawing should show all dimensions required to ensure mechanical interchangeability.

4.1.2 The drawing using third angle projection, should include:

a) a suitable side-view;

b) suitable end-views, where appropriate; and

c) such additional views and details as are required to show any special configuration or features.

4.1.3 The following information should also be provided:

a) The projection method where there is more than one view, indicated as in Fig. 1.

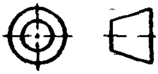

FIG. 1 INDICATION OF THIRD ANGLE PROJECTION

b) Designation codes of ISI, IEC and other interested countries.

4.1.4 When a drawing is re-issued because of modifications, the changes made should be indicated by arrows in the margin.

4.1.5 While drawings need not to be drawn to scale, they should be roughly in proportion and, where necessary for clarity, enlarged detail drawing(s) should be used.

4.2 Dimensions and Tolerances

4.2.1 Dimensions of outline drawings quoted shall apply to the finished product. They should, therefore, not quote manufacturing tolerances, but give customers acceptance limits.

4.2.2 The following types of dimension may be used on the drawings as appropriate:

a) *Toleranced dimensions* — A toleranced dimension can be expressed:

  1) preferably by both minimum and maximum limits; or

  2) by a nominal value and maximum and minimum limits. Such a nominal value need not necessarily be the average of two limits.

b) *Untoleranced dimensions*

  1) *Untoleranced limiting dimensions* — minimum only or maximum only.

  2) *Untoleranced nominal dimensions* — These dimensions may be used:

    i) either for general information as an actual nominal figure;

    ii) or to specify true geometrical position (by means of linear or angular dimensions). Such dimensions shall be indicated by an asterisk (*) after the numerical value, the asterisk in this sense meaning 'true geometrical position'.

4.2.3 Single minimum, single maximum or single nominal (where not given for general information) dimensions should be stated in decimals to such a number of places as is considered adequate to express the degree of accuracy appropriate for that dimension; for example, if measurement to the nearest 0·001 mm is considered appropriate, the dimension should be expressed to the third decimal place (for example, 0·500 mm), but if the measurement to the nearest 0·01 mm is sufficient, the dimension should be expressed to the second decimal place (for example, 0·50 mm) and so on.

4.2.4 Limiting values or nominal value and limits of a toleranced dimension should be stated with the same number of decimal places (for example, 0·016 mm *Min* — 0·017 mm *Nom* — 0·019 mm *Max*).

4.2.5 Numerical dimensions should not be shown directly on the figure(s). They should be shown in tabular form under the figure(s) and correspond to the reference letter symbols on the figure(s).

4.2.5.1 The letter symbols on the figure(s) should be upright. Upper case letters should be used for device outline and case outline dimensions and lower case letters for base outline dimensions.

4.2.5.2 If confusion should arise, upper case letters should preferably be used throughout.

4.2.6 In the case of a diameter, the symbol 'ϕ' should appear after the reference letter concerned on the figure(s).

4.2.6.1 In cases where the cross-section is uncontrolled (not necessarily round), the 'ϕ' symbol should not be used.

4.2.7 The dimensions and limits which should normally be given and their corresponding reference letter symbols are contained in Appendix B. Some examples of drawings prepared in accordance with these rules are given in Appendix C.

4.2.7.1 Where a particular reference letter should be used for more than one dimension on the same drawing, use should be made of a suffix to identify the dimensions.

4.2.7.2 Appendix B may not be expected to include all dimensions likely to be necessary for mechanical standardization, more particularly in the future. A distinction has been made between primary and secondary reference letter symbols, primary reference letter symbols being those which are used frequently, and secondary reference letter symbols being those which are used less frequently and which can, if necessary, be associated with dimensions other than those given in the table.

4.2.8 Where it is self-evident that several angles are equal, it is not necessary to show more than one angle in the figure(s).

4.2.9 Notes will be numbered and placed under the table of dimensions which will have a 'notes' column on the right-hand side. The note reference will be placed opposite the dimension to which the note refers to in the table, or when this dimension does not appear in the table, in the figure(s). The numerical sequence of the notes should follow the alphabetical sequence of the dimensional reference letters to which the notes refer. Notes referring to the figure(s) should follow notes referring to dimensions given in the table.

5. IDENTIFICATION OF TERMINATIONS

5.1 General — Principally terminations can be identified by a number of methods, namely:

a) Numbering of terminals,
b) Colour coding,
c) Coding by means of symbols, and
d) Physical shapes.

5.2 Numbering by Terminals — *see* 7.2.

5.3 Colour Coding — Under consideration.

5.4 Coding by Means of Symbols

5.4.1 *For Diodes* — The diode symbol [*see* **3.7** of IS : 2032 (Part VIII)-1965*] may be used.

5.4.2 *For Other Devices* — Under consideration.

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*Graphical symbols used in electrotechnology: Part VIII Semiconductor devices.

5.5 Physical Shapes — Where the devices are very small in size, it may be preferable to use physical shape of the devices or leads themselves for identification of termination.

6. ADDITIONAL RULES FOR DEVICE AND CASE OUTLINE DRAWINGS

6.1 Device Outline Drawing — The device outline drawings should include all dimensional characteristics required for interchangeability in accordance with general rules.

6.2 Case Outline Drawing — The case outline drawings should include all dimensional characteristics required for interchangeability in accordance with general rules, omitting the terminal dimensioning which will be given on the associated base drawings.

6.2.1 On the case outline drawings, the terminals should be shown only by dotted lines.

6.3 Where the requirements for mechanical interchangeability will permit, the minimum and maximum dimensions should be chosen so that the creation of unnecessary drawings of variants is avoided.

7. ADDITIONAL RULES FOR BASE OUTLINE DRAWINGS

7.1 General Rules

7.1.1 The base outline drawings should include the dimensional characteristics required for interchangeability of the base and in certain instances for compatibility between the base and a socket.

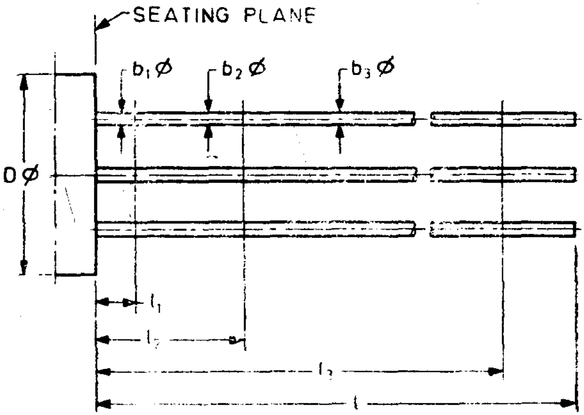
7.1.2 The terminals should be numbered in accordance with **7.2**.

7.1.3 The following system should be used to locate the terminals on the bases:

a) The true geometrical position of the terminals (or of the holes in gauges) is defined by angular spacing on a pitch circle (polar co-ordinates) or by rectangular co-ordinates in relation to certain fixed references. Such dimensions are not toleranced.

b) The positional tolerance is indicated by stating that the cross-section of each terminal at its point of origin or at a specified distance from the seating plane lies in a circle (of stated diameter) centred at the true geometrical point defining the terminal axis.

7.1.4 The following system (*see* Fig. 2) should be used either in total or in part to indicate the dimensions of the terminals.



$b_1\,\phi$ applies over the length l_1,
$b_2\,\phi$ applies over the length $l_2 - l_1$, and
$b_3\,\phi$ applies over the length $l_3 - l_2$ or where appropriate over $l - l_2$.

FIG. 2 INDICATION OF DIMENSIONS OF TERMINALS

7.2 Numbering of Terminals — Where possible, device terminals should be identified by numbers according to the system outlined in **7.2.1** to **7.2.5**. In all instances terminals are considered as being viewed from their free ends.

7.2.1 *Single-Ended Devices with Terminals in a Linear Array*

7.2.1.1 *Symmetrical linear array* — The terminal nearest to the reference mark should be numbered as No. 1, the other terminals should be numbered progressively from terminal No. 1.

7.2.1.2 *Asymmetrical linear array* — The terminals should be numbered progressively from the end having the most number of terminals.

7.2.2 *Single-Ended Devices with Terminals in a Circular Array*

7.2.2.1 The terminal, the centre of which is past the datum line, should be numbered as No. 1, the other terminals should be numbered progressively and in a clockwise sequence from No. 1.

7.2.2.2 Where a terminal is situated in the centre of the base, this should be known as the centre terminal and shall not be given a number.

7.2.2.3 Where omission of one terminal in an otherwise equally spaced array identifies the datum line, the position of the omitted terminal should not be numbered; but, in a fixed modular circular array, any location of omitted terminal which does not define a datum line should be numbered.

7.2.3 *Double-Ended Devices* — Terminals on both end views should be numbered without duplication of numbers.

7.2.4 *Devices with Terminals Disposed in a Square or Rectangular Periphery* — (Under consideration).

7.2.5 *Other Devices* — For devices having terminals, mounting studs, holes, in more than one plane, the following rules should apply and the numbering should start at the end:

a) Opposite to the end containing a threaded stud or hole;

b) Opposite to the end with the smallest number of terminals;

c) Opposite to the end identified by a hand, dot or other applied visual identification;

d) Opposite to the end with the larger ferrule, flange, insert, etc.

7.3 Methods for Locating the Datum Line — These methods are listed below in order of preference. When more than one of these methods is possible for a given device, the method appearing earliest in the list should be used. When none of the following methods is possible, the method best suited to the device should be used.

The datum line can be located as:

a) the radial line through the centre of the mechanical or visual index;

b) the radial line midway between the two terminals which obviously comprise a gap in an otherwise equally spaced circular terminal array;

c) the radial line 180° from the locating radius of the most isolated terminal;

d) the radial line 180° from the mid-point of, in order of preference:

  1) the two most widely spaced terminals; and

  2) the two most closely spaced terminals;

e) the radial line through the centre of the index terminals. In order of preference, the index terminal is defined as that having:

  1) the smallest cross-sectional area at the point of emergence from the case,

  2) the greatest axial length, when one terminal is noticeably longer than the others, and

3) the smallest axial length, when one terminal is noticeably shorter than others.

8. RULES FOR CODING

8.1 The following coding system should be used to identify the device base and case outlines covered by the drawings contained in this standard:

a) *Device Outlines* — Code letter 'OD' followed by a serial number.

b) *Base Outlines* — Code letter 'OB' followed by a serial number.

c) *Case Outlines* — Code letter 'OC' followed by a serial number.

8.2 Where type variants are shown as types A, B, C, etc, these should be distinguished by adding the appropriate letter (A, B, C, etc.) to the coding system.

Examples:

OD-5, OD-7A, OB-2B, OC-3.

APPENDIX A

(*Clause* 3.1)

STANDARDIZATION PHILOSOPHY

A-1. GENERAL

A-1.1 If an equipment designer allows for the dimensions and tolerances indicated by the drawing, he will be able to take advantage of the availability of supplies from more than one source. Where an equipment designer is unable to do this, for instance because of stringent space considerations, it follows that he may be limiting his possible suppliers.

A-1.2 When a device is likely to be used in an equipment where there are stringent packing density requirements (generally the case for low-power devices) the space required for the body of such a device is closely defined. For a high-power device (where generally the heat sink to which it is attached is larger than the device) packing density is not the chief factor when considering mechanical standardization. Parts used for fixing the devices, such as bases, studs, etc, are closely defined.

A-1.3 In this standard it has, therefore, been attempted to standardize those dimensions considered to be important for mechanical interchangeability in all its aspects and to dimension them closely, leaving the device manufacturer as much freedom as possible for other dimensions.

A-1.4 Case outline and base outline drawings have been shown separately because different bases may be associated with the same case outline or different case outlines may be associated with the same base outline. In case of device outlines, the drawing contains all the dimensional information and there are no separate base drawings.

A-1.5 Some outline drawings show a controlled cylindrical zone. This zone defines a portion of the body of a minimum length over which the diameter is controlled to closer tolerances than is allowed over the full length of the body. This zone defines a mechanical contact surface, on all devices embraced by the particular outline drawing, which may be used for mechanical mounting and for heat sink design on case rated devices.

A-2. TYPE VARIANTS

A-2.1 Some drawings show type variants. These cover devices which have basically the same shape and size, but differ in one or more respects which may affect interchangeability in certain applications, such as difference in one dimension. Examples are the body diameter of double-ended devices, lengths of terminals and stud lengths. These variants are shown as Type A, Type B, etc.

A-3. SPACE CYLINDER CONCEPT

A-3.1 Most of drawings considered, give an outline of space cylinder except where dimensions are required to be more closely defined. For low-power devices, the space cylinder accommodates the body. For high-power devices, because of the different interchangeability requirements, the space cylinder has been extended to include parts other than the body.

This is known as the space cylinder concept and it has been thought desirable to include in this appendix full details of the considerations applying this concept to high-power devices.

A-3.2 High-power Devices

A-3.2.1 *The Bases*

a) For stud-ended devices, the stud should be closely defined in terms of diameter, pitch and length.

b) For flat base devices, the dimensions for fixing should be precisely indicated.

A-3.2.2 *The Body*

a) The diameter of the space cylinder depends on the construction, for example, for stud-ended types it would be the 'across flats' dimension of the hexagon. The length of the space cylinder depends on the type of termination provided, and examples are considered in **A-3.2.3**.

b) Dimensions for both the across-flats and across-corners dimensions of the hexagon are to be given; the across-flats dimension is useful in choosing a suitable spanner for mounting, and the across-corners dimension is necessary for interchangeability when the device is screwed into the heat sink.

c) The height of the hexagon flange is not so important in the space cylinder concept and in general only a minimum will be given for this dimension, which permits the hexagonal prism to extend the full height of the body of the device. There is no need to specify the minimum height of the flats at the corners of the hexagon when the manufacturer states the limits of torque which may be applied.

A-3.2.3 *Terminations* — The extent of the space cylinder is considered for rigid lug devices, flexible terminal devices and post-ended devices.

a) *Rigid lug devices* — Since most devices of this type are stud-ended, the final orientation of the lug(s) is not determined and the space cylinder includes the lug(s). No part of the lug(s) may be outside this space cylinder. Figure 3 illustrates this presentation.

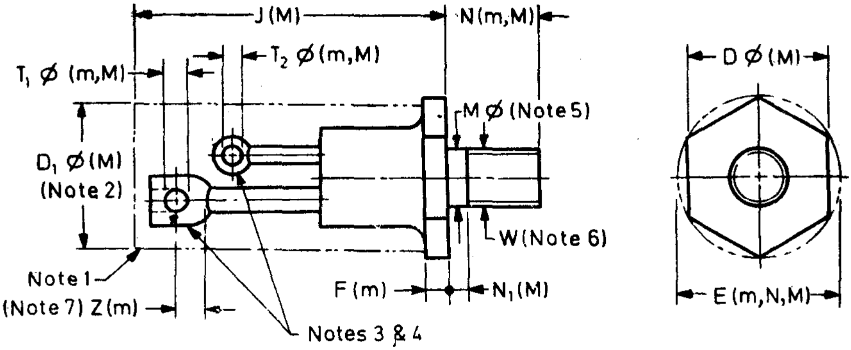
b) *Flexible terminal devices* — The user of a high-power flexible terminal device requires to know:

   1) The distance from the seating plane to the hole in the termination (when the flexible terminal is very flexible and can easily be bent, only a minimum dimension of this distance is sufficient to ensure interchangeability; if it is not, the difference between the maximum and the minimum should be compatible with good engineering practice).

   2) The seated height of the device when the terminal is bent at right angles. (The user can then calculate how far the terminal at the end of the flexible terminal will extend laterally from the axis of the device.)

   Devices of this type use a space cylinder of diameter equal to the across flats dimension of the hexagon (or as appropriate for flat base devices) and of length equal to a dimension which includes an allowance for the axially mounted terminal to be bent at right angles. Figure 4 illustrates this presentation.

c) *Post-ended devices* — It will be apparent from consideration of **A-3.2.1** and **A-3.2.2** that the space cylinder will be of length equal to the mounted height and of diameter appropriate to the design, for example, ' across-flats ' for stud-ended rectifiers.



m = Minimum   *M* = Maximum   *N* = Nominal

NOTE 1 — This device with the exception of the hexagon and stud lies within the cylinder of diameter D_1 and length J.

NOTE 2 — Diameter D_1 shall not be greater than the actual across flats dimension of the hexagon.

NOTE 3 — Contour and orientation of terminal lugs are undefined.

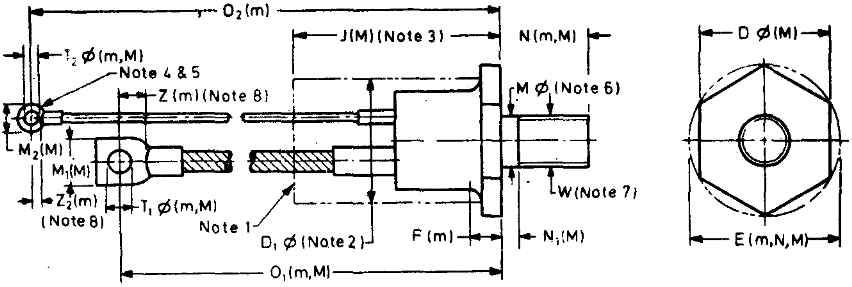
NOTE 4 — The large terminal lug is No. 1, the small terminal lug is No. 2.

NOTE 5 — Diameter M refers to zone N_1. The maximum value should not exceed the outside diameter of the thread.

NOTE 6 — Metric thread reference.

NOTE 7 — Minimum flat.

FIG. 3 EXAMPLE OF RIGID LUG DEVICE



m = Minimum   *M* = Maximum   *N* = Nominal

NOTE 1 — The device with the exception of the hexagon stud and flexible leads lies within the cylinder of diameter D_1 and length J.

NOTE 2 — Diameter D_1 shall not be greater than the actual across flats dimension of the hexagon.

NOTE 3 — Dimension J includes an allowance for the flexible leads to be bent at right angles.

NOTE 4 — Contour and orientation of terminal lugs are undefined.

NOTE 5 — The large terminal lug is No. 1, the small terminal lug is No. 2.

NOTE 6 — Diameter M refers to zone N_1. The maximum value should not exceed the outside diameter of the thread.

NOTE 7 — Metric thread reference.

NOTE 8 — Minimum flat.

FIG. 4 EXAMPLE OF FLEXIBLE TERMINAL DEVICE

APPENDIX B

(*Clauses* 4.2.7 *and* 4.2.7.2)

REFERENCE LETTER SYMBOLS

B-1. Where appropriate to the particular drawing being prepared, the dimensions listed in the following table should be given with the associated reference letter symbols:

REFERENCE LETTER SYMBOL	DESCRIPTION OF THE DIMENSION	TYPE OF LIMITS			NOTES
A	Length from seating plane to top of case	*Min*	—	*Max*	P
a	Pitch circle diameter of terminals	—	Nom*	—	P
B, *b*	Diameter of a terminal, or of the larger terminal, if the cross-section is circular If the cross-section is not circular, width or major axis of the cross-section of a terminal	*Min*	—	*Max*	1, 2, 3, P
B_1, b_1	Other diameter of terminal as shown in Fig. 2	—	—	*Max*	P
B_2, b_2	Other diameter of terminal as shown in Fig. 2	*Min*	—	*Max*	P
B_3,b_3	Other diameter of terminal as shown in Fig. 2	—	—	*Max*	P
C,*c*	Diameter of smaller terminal, if the cross-section is circular If the cross-section is not circular, thickness or minor axis of the cross-section of a terminal	*Min*	—	*Max*	1,2,3,4,S
D	Diameter or major axis of case	*Min*	—	*Max*	1,P
D_1	Smallest diameter of case	*Min*	—	*Max*	1,P
D_2, D_3, etc	Other diameters of case	*Min*	—	*Max*	1,P

NOTE — P = Primary reference letter symbol } *see* **4.2.9.**
S = Secondary reference letter symbol }

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*True geometrical position.

REFERENCE LETTER SYMBOL	DESCRIPTION OF THE DIMENSION	TYPE OF LIMITS			NOTES
d	Distance from an axial reference line to a terminal centre	—	Nom*	—	S
E	Minor axis of case	*Min*	—	*Max*	1,S
	Or				
E	Across-flats dimension of a hexagon	*Min*	Nom	*Max*	1,2,S
e	Distance between two terminal centres (distance between the centres of the nearest terminals when there are more than two terminals)	—	Nom*	—	S
	Or				
e	Clearance between two terminals	*Min*	—	—	S
e_1, e_2,etc	Other distance terminal between centres	—	Nom*	—	S
	Or				
e_1, e_2, etc	Clearance between terminals	*Min*	—	—	S
F	Thickness or length of flange zone of the case including any fillet if present	*Min*	—	*Max*	2,S
G	Overall length excluding terminals and slugs	*Min*	—	*Max*	1,S
G_1	Overall length excluding terminals but including slugs	—	—	*Max*	S
H	Overall length including terminals	*Min*	—	—	S
h	Height of a mechanical index	*Min*	—	*Max*	S
J	Seated height or mounted height	—	—	*Max*	P
j	Width or diameter of a mechanical index	*Min*	—	*Max*	S
K	Length of top zone of the case	—	—	*Max*	S

NOTE — P = Primary reference letter symbol } *see* **4.2.9.**
S = Secondary reference letter symbol }

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*True geometrical position.

Reference Letter Symbol	Description of the Dimension	Type of Limits			Notes
k	Length of a mechanical index	*Min*	—	*Max*	S
L, l	Length of a terminal	*Min*	—	*Max*	2,5,6, P
L_1, l_1	Other length of terminal as shown in Fig. 2	—	—	*Max*	5,P
L_2, l_2	Other length of terminal as shown in Fig. 2	*Min*	—	—	5,P
L_3, l_3	Other length of the terminal as shown in Fig. 2	*Min*	—	*Max*	2,5,P
M, m	Diameter or width of a terminal stud or slug	*Min*	—	*Max*	1,P
N, n	Overall length of a stud threaded entirely or partially or not at all	*Min*	—	*Max*	P 1,P
N_1, n_1	Distance to end of full thread (unthreaded portion) of a stud	*Min*	—	*Max*	1,P
O	Distance between seated plane and centre of hole in the lug of a terminal	*Min*	—	*Max*	2,S
P	Length of controlled zone of the case	*Min*	—	—	S
p	Diameter of a mounting hole	*Min*	—	*Max*	S
Q	Other dimensions				S
q	Distance between the centres of two mounting holes	*Min*	—	*Max*	S
R, r	Curve radii	*Min*	—	*Max*	1,2,P
R_1, r_2	Curve radii of the ends of the base seat	—	—	*Max*	P
S	Distance from a reference line to the centre line of a terminal	*Min*	—	*Max*	1,S

NOTE — P = Primary reference letter symbol } *see* **4.2.9.**
S = Secondary reference letter symbol }

REFERENCE LETTER SYMBOL	DESCRIPTION OF THE DIMENSION	TYPE OF LIMITS			NOTES
s	Distance from the reference line through the centres of two terminals to the centre of the mounting hole which is the farthest from this reference line	—	Nom*	—	S
T, *t*	Diameter of the hole (or smallest dimension of a non-circular hole) in a terminal lug or slug	*Min*	—	*Max*	2,P
V, *v*	Depth of a tapped hole	*Min*	—	*Max*	S
W, *w*	Diameter of the threaded portion of a stud with full thread form, or diameter of a tapped hole	Thread reference			7,P
x - *x* *y* - *y*	Section reference, continuous	—	—	—	P
x - *y*	Section reference, not continuous	—	—	—	P
Z, *z*	Other dimensions	—	—	—	S
α	Small angle	—	Nom	—	P
β,γ	Larger angles	—	Nom	—	P

NOTE 1 — Minimum dimension may be omitted where appropriate.

NOTE 2 — Maximum dimension may be omitted where appropriate.

NOTE 3 — To distinguish in the same drawing between major and minor axes of cross-section of different terminals having different dimensions, the signs (′) prime (″) second, etc, may be used with reference letters *B*, *b* and *C*,*c*.

NOTE 4 — Reference letter symbols C_1, c_1; C_2, c_2; C_3, c_3 may also be used in the same manner as reference letter symbols *B* or *b*.

NOTE 5 — Measured from the seating plane.

NOTE 6 — For terminals of different overall lengths, the letter symbols L_z, l_z, L_y, l_y, L_x l_x, L_w, l_w, etc, may be used.

NOTE 7 — Metric thread reference (the pitch is assumed to be coarse unless otherwise stated) (*see* IS: 1330-1958† and IS: 1362-1962‡).

NOTE 8 — P = Primary reference letter symbol
S = Secondary reference letter symbol } *see* **4.2.9.**

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*True geometrical position.

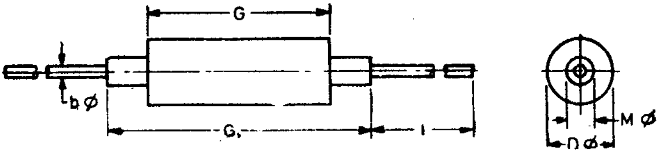
†General plane for metric screw threads with ISO profile (diameter range 0·25 to 300 mm).

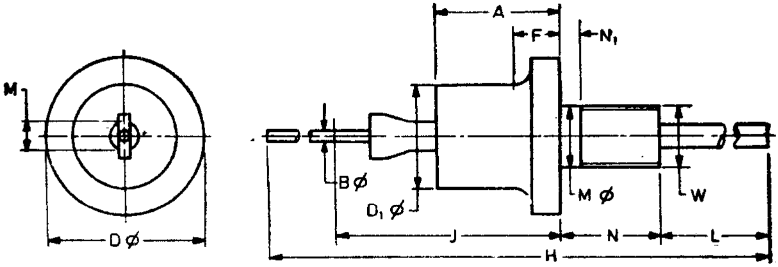
‡Dimensions for screw threads for general purposes (diameter range 1·6 to 39 mm) (*revised*).

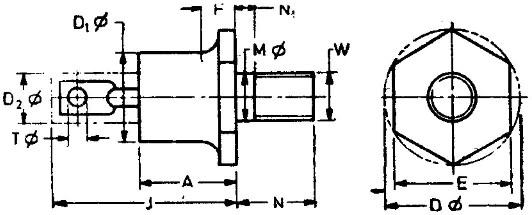
APPENDIX C

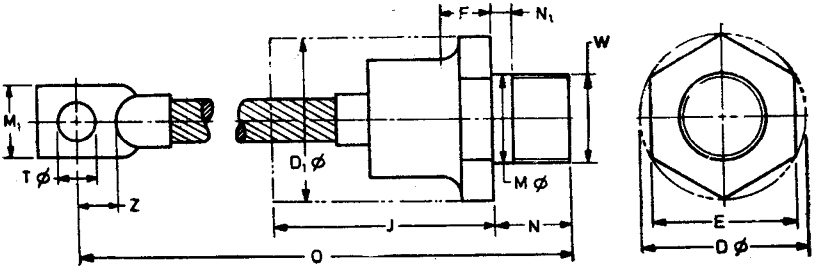
(*Clause* 4.2.7)

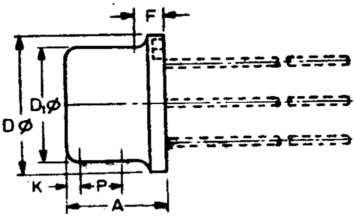
EXAMPLES OF DRAWINGS OF SEMICONDUCTOR DEVICES







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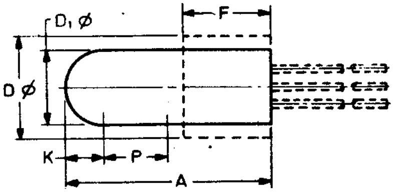
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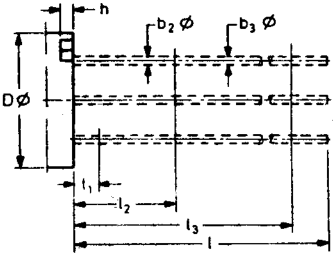
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b₃ ⌀
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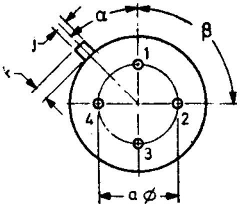
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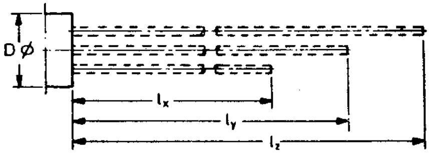
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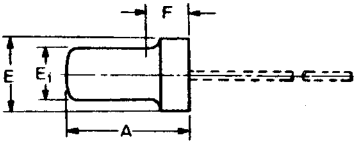
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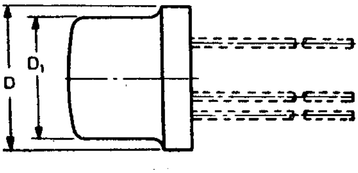
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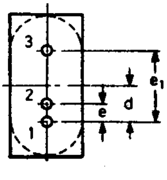
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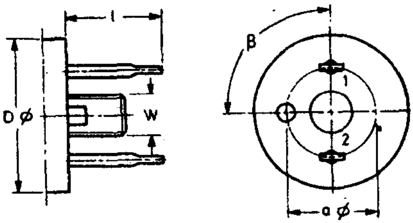
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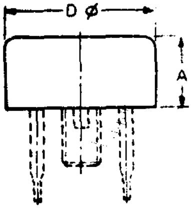
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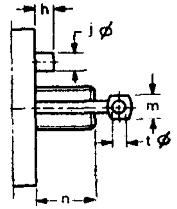
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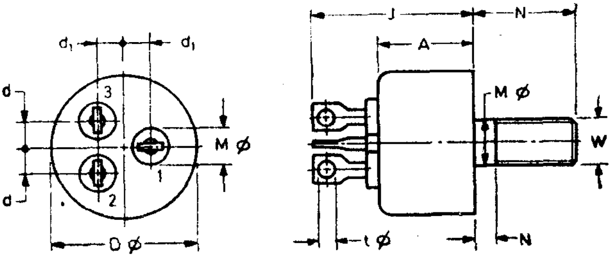
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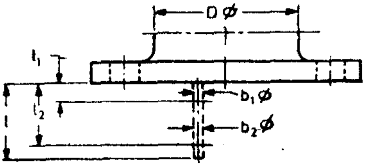
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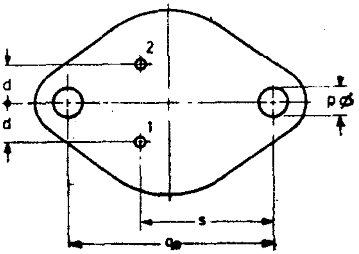
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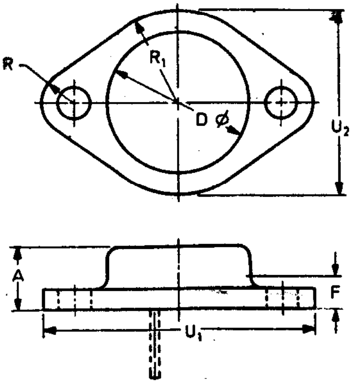
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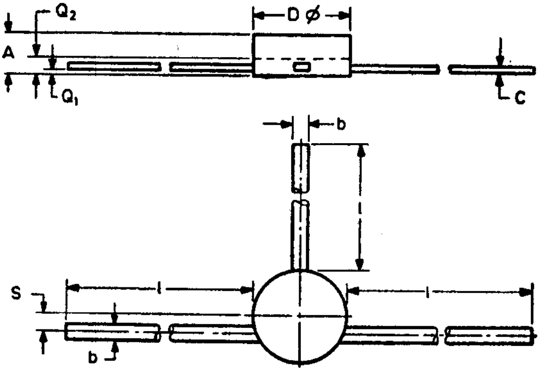
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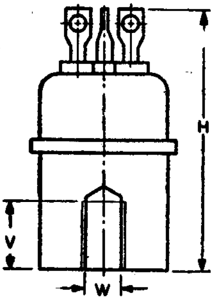
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